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(54) **ELECTRICAL CORKSCREW WITH DEPTH PENETRATION REGULATOR**

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(58) **Field of Search** 81/3.2, 3.09, 3.48

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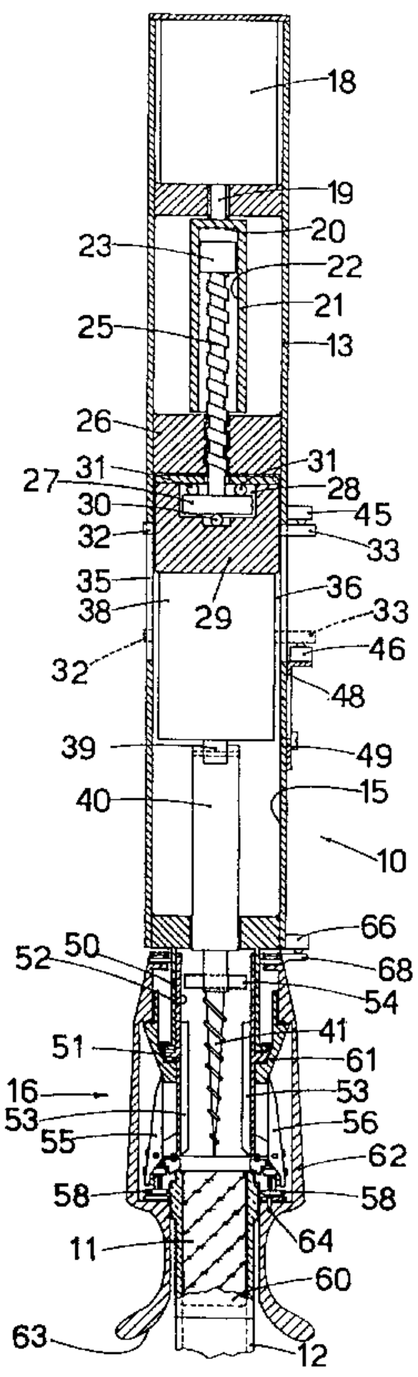
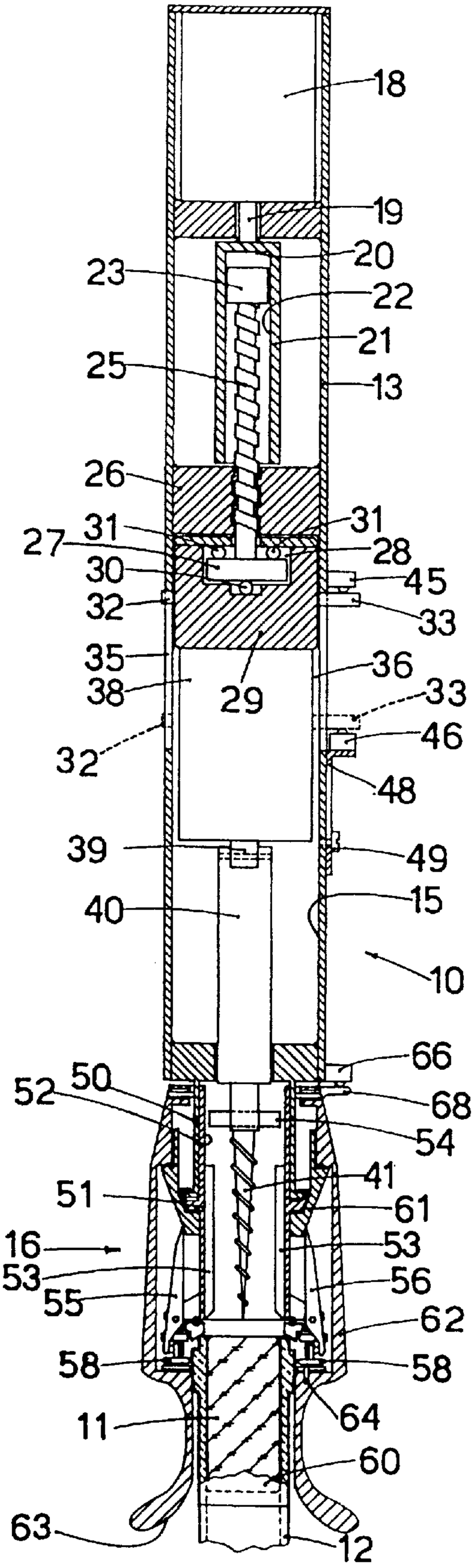
(57) **ABSTRACT**

A device to automatically removed the cork **(11)** from a bottle **(12)**, comprising a first screw **(41)** suitable to screw into the cork **(11)** and rotation means **(38)** associated with the first screw **(41)** to make it selectively rotate and penetrate into the cork **(11)**, there being regulation means **(33, 45, 46)** associated with the first screw **(41)** to regulate its penetrative travel into the cork **(11)** according to the length of the latter, and hence the cork **(11)** can also be removed only partly from the bottle **(12)**.

18 Claims, 1 Drawing Sheet

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ELECTRICAL CORKSCREW WITH DEPTH PENETRATION REGULATOR

FIELD OF THE INVENTION

This invention concerns a device, provided with electric motors, to automatically remove corks from bottles, as set forth in the main claim.

To be more exact, the invention refers to a device which allows to automatically remove from a bottle both the cork, usually made of cork, and also the protective cap, usually made of metal or plastic material, wherein all the different steps are carried out by means of electric motors.

The device according to the invention is suitable to be used in any premises, either public or private, and is particularly suitable to be installed in public premises such as restaurants, inns, pubs or similar, where there is a frequent need to open bottles.

BACKGROUND OF THE INVENTION

In the state of the art, to remove the cork from a bottle the main steps are as follows: first the metallic or plastic protective cap (if any) which covers the cork must be removed; a self-threading screw is then made to penetrate into the cork until the thread has obtained a sufficient grip on the cork; the cork is then removed from the bottle, with a prevalently axial movement, with the help of one or more levers associated with one or more handles.

There are many corkscrews on the market which allow to carry out the above steps either manually or semi-automatically.

The most commonly used corkscrews are those operated manually; among them there is PCT N° WO-A-92/04273, of which the present Applicant is the Proprietor. This document discloses a corkscrew provided with a mechanism which allows to cut the protective cap when the screw is screwed into the cork, and then remove the part of the cap which has been cut together with the cork itself. This mechanism comprises a plurality of cutter wheels which are made to adhere to the cap by means of a system of levers activated by a sleeve which is made to slide axially with respect to the body of the corkscrew.

Even though it has solved a series of problems, this corkscrew still has the same disadvantages as all other manual corkscrews known to the art, that is, that all the operations have to be carried out by hand, with a considerable waste of time and energy on the part of the users, especially if they are restaurateurs or bartenders, or manage bars, pubs, inns or similar public premises, where such opening operations are frequently required.

There is also, in the state of the art, a device to remove corks wherein the screw, used to screw into the cork, is commanded by an electric motor. In this device the screw is laid on the upper part of the cork, the motor is fed electrically, so that the screw can turn and penetrate inside the cork, after which the motor is stopped. The device is then distanced from the bottle, until the cork has been removed. In this device, as the screw is not controlled in its travel, it normally penetrates the cork and completely perforates it, exiting through the inner end, with the disadvantage that it very often makes little pieces of cork fall inside the bottle and therefore into the content thereof, wine or other liquid whatever it may be.

Obviously, this is unacceptable, especially when the content is a valuable wine which must be served and drunk without any impurities.

U.S. Pat. No. 5,372,054 discloses an apparatus for automatically extract a cork from a bottle, wherein a corkscrew is associated to a reversible electric motor which, with a clockwise rotation, completely penetrates the cork, passing throughout thereof. In this apparatus the bottle neck is insertable into a tubular housing in which a tubular shuttle is axially slidable and the shuttle includes a stop to limit the insertion depth of the bottle neck. The electric motor, with its rotation in a clockwise direction, firstly causes the bottle neck and the shuttle to be pulled towards the stop position within the tubular housing, while the corkscrew penetrates into the cork, and then, when the shuttle and bottle neck are stopped causes a further penetration of the corkscrew into the cork and the extraction of the cork from the bottle neck, due to the auger effect of the corkscrew. The cork is withdrawn almost completely from the bottle neck, until the cork strikes a sensor. By reversing the motor, the counter-clockwise rotation of the corkscrew cause the push of the cork which does not rotate due to the presence of longitudinal ribs within the shuttle. This apparatus, even if allows to remove the cork almost completely from the bottle neck, has the drawback that the cork is always completed perforated by the corkscrew, so that little granulated parts of the same cork fall inside the bottle.

The present Applicant has devised and embodied this invention to overcome the shortcomings of the state of the art and to obtain further advantages.

SUMMARY OF THE INVENTION

The invention is set forth and characterised in the main claim, while the dependent claims describe other innovative characteristics of the main embodiment.

One purpose of the invention is to achieve a device to open a bottle, wherein it is easily possible to regulate the penetrative travel of the screw into the cork, so as to determine, in advance, before beginning the opening operation, how many millimetres the screw has to penetrate into the cork.

This allows to achieve two important and useful objectives: firstly to open the bottle only partly, and secondly to prevent the screw from completely perforating the cork.

The fact that it is possible to open the bottles only partly, keeping the corks partly inside the bottles, can be particularly useful when several bottles have to be prepared half-opened, for example before a banquet or a dinner with a large number of diners; in this case the bottles can be completely opened manually only when needed, at the last moment, in front of the diner himself, and in an extremely short time. This has considerable advantages both for hygiene and for the wine.

Another purpose of the invention is to achieve a device wherein all the different steps of opening the bottle are achieved automatically and quickly, without the user having to exert any physical force, either to tighten the screw into the cork or to remove the cork from the bottle, or to remove the cork from the screw.

A further purpose of the invention is to achieve a device to automatically remove the cork from a bottle and at the same time remove at least a portion of the protective cap which has previously been cut, again automatically.

In accordance with these purposes, the device to automatically remove the cork from a bottle comprises a screw suitable to be tightened into the cork and rotation means associated with the screw to make it selectively rotate and penetrate the cork. According to one characteristic of the invention, regulation means are associated with the screw to

regulate its penetrative travel into the cork according to the length thereof, so that the cork can also be removed only partly from the bottle.

According to another characteristic, the penetrative travel of the screw into the cork is a few millimetres, advantageously between 6 and 12, less than the length of the cork.

According to another characteristic, a first electric motor is suitable to command the axial displacement of the screw and the regulation means comprise electric switching means associated with the electric motor to selectively command its start and stop.

According to a further characteristic, the rotation means for the screw comprise a second electric motor.

BRIEF DESCRIPTION OF THE DRAWING

These and other characteristics of the invention will become clear from the following description of a preferred form of embodiment, given as a non-restrictive example, with the help of the attached FIGURE which shows a longitudinal cross section of a device according to the invention.

DETAILED DESCRIPTION OF A PREFERRED FORM OF EMBODIMENT

With reference to the attached FIGURE, a device **10** to automatically remove the cork **11** from a bottle **12** comprises an upper tubular body **13**, substantially cylindrical in shape and provided internally with a cavity **15**, and a lower assembly **16** suitable to couple selectively with the neck of the bottle **12** which is to be opened.

In the upper part of the cavity **15** of the tubular body **13**, a first electric motor **18** is fixedly mounted, with its rotation shaft **19** facing downwards and keyed onto an upper part **20** of a tube **21**, provided with an inner cavity **22** with a substantially square cross section.

Inside the tube **21** there is a block **23** which also has a substantially square cross section, and which is suitable to slide axially with respect to the tube **21**.

The upper part of a screw **25** is attached to the block **23**; the screw **25** is constantly engaged with a corresponding nutscrew or lead nutscrew **26** mounted stationary inside the cavity **15**.

The lower part of the screw **25** is solid with an element **27**, substantially cylindrical in shape, which is free to rotate inside a cylindrical seating **28** made in a cylindrical block **29**, assembled axially sliding inside the cavity **15**.

In the seating **28**, below the element **27** and in a central position, there is a bearing **30**, while a plurality of bearings **31** are arranged between the element **27** and the upper part of the cylindrical block **29**, in order to reduce to a minimum the friction between the element **27**, which can rotate, and the block **29**, which can only slide axially together with the screw **25**.

The block **29** is provided with two lateral fins **32** and **33**, arranged on diametrically opposite sides, which are inserted inside two corresponding longitudinal slits, respectively **35** and **36**, made on the tubular body **13**.

Inside the cavity **15**, and attached to the block **29**, there is a second electric motor, identical to the motor **18**; the second motor **38**, however, can slide axially with respect to the tubular body **13**, unlike the motor **18** which is fixed.

The shaft **39** of the motor **38** is keyed to a cylindrical rod **40**, at the lower end of which there is in turn attached a screw **41**, with a tapered, self-threading shank, suitable to screw selectively into the cork **11**.

According to one characteristic of the invention, the fin **33** is suitable to cooperate with two micro-switches **45** and **46**, assembled on the outer part of the tubular body **13**.

To be more exact, the first micro-switch **45** is assembled stationary, directly on the body **13**, above the fin **33**, so that it is driven by the latter when the block **29** and the motor **38** are displaced upwards, to the upper end of their travel, as will be explained in more detail later.

The second micro-switch **46** is assembled on a supporting bracket **48**, assembled below the fin **33**, sliding on the body **13** and able to be selectively clamped at a variable height by means of a clamping knob **49** which can be screwed onto the body **13**.

The micro-switch **46** is suitable to be actuated by the fin **33** when the block **29** and the motor **38** are displaced downwards, to the lower end of their travel, as will be described in more detail later.

The motors **18** and **38** are fed advantageously with low tension direct current, for example 24 volt, by means of a feeder-straightener, of a known type and not shown in the drawing, connected to the electric supply network.

The lower assembly **16** is of a known type, for example of the type described in the Italian patent n°. 1.274.318, filed on Jan. 27, 1994 by the present Applicant and granted on Jul. 17, 1997. The description of the assembly **16** from the above Italian patent is summarised here, so that the invention can be more easily understood.

The assembly **16** comprises a lower appendix **50**, internally hollow and attached to the lower part of the tubular body **13**, and an element **51**, also tubular, assembled rotatable inside the appendix **50**.

The tubular element **51** defines a central cylindrical cavity **52** at the centre of which is accommodated the screw **41**; it is provided internally with four vertical ribs **53**, at an equal angular distance from each other and protruding towards the inside of the cavity **52**. The ribs **53** are suitable to retain the cork **11** when it is removed from the bottle **12**.

A transverse pin **54**, mounted on the upper part of the screw **41**, is suitable to cooperate with the ribs **53** to make the tubular element **51** rotate selectively.

On the lower end of the tubular element **51**, on diametrically opposite sides, two levers **55** and **56** are pivoted, and cooperate, in the lower part, with cutter wheels **58** suitable to selectively cut the cap **60** which usually surrounds the neck of the bottle **12**.

The upper ends of the levers **55** and **56** cooperate with a conical element **61**, which is axially sliding with respect to the tubular element **51** and can rotate therewith.

A substantially cylindrical sleeve **62** is assembled outside the appendix **50** and can slide with respect thereto only in an axial direction.

The sleeve **62** is provided with a lower mouth **63** and is connected to the conical element **61** to command the axial sliding thereof with respect to the tubular element **51**.

A vertical pin **64** is assembled on the sleeve **62** to cooperate with the lower part of the tubular element **51** and to selectively prevent the latter from rotating in an anticlockwise direction.

According to one characteristic of the invention, a third micro-switch **66** is attached to the lower end of the tubular body **13** and is suitable to cooperate with a lateral fin **68** of the sleeve **62** when the latter is displaced upwards, to the upper end of its travel, as will be described in more detail later.

The device **10** is suitable to be attached vertically to a stationary wall, by any known attachment means.

The device **10** as described here functions as follows:

In the inactive position the screw **25**, the block **29**, the motor **38**, the screw **41** and the sleeve **62** are all displaced upwards, as shown in the attached FIGURE.

In order to automatically pull the cork **11** of the bottle **12** and at the same time remove the upper part of the cap **60**, the bottle **12** itself is inserted from the bottom into the mouth **63** of the sleeve **62**.

The sleeve **62** is then made to slide axially downwards, causing, in a known manner, the conical element **61** to be lowered; in turn, by means of the levers **55** and **56**, the conical element **61** takes the cutter wheels **58** towards the cap **60** until they cut it, as described in the afore-mentioned Italian patent n. 1.274.318.

Lowering the sleeve **62** also causes the micro-switch **62** to open, which thus activates the simultaneous feed of the two electric motors **18** and **38**.

The stationary motor **18** makes the shaft **19** rotate in a clock-wise direction; it also makes the tube **21** rotate, and with it the block **23** and the screw **25**. The latter, being engaged with the nutscrew **26**, which is stationary, screws onto the nutscrew **26** and is displaced axially downwards.

Consequently, the block **29**, the movable motor **38**, the rod **40** and the screw **41** are also displaced axially downwards.

At the same time as this axial displacement takes place, the motor **38** makes the rod **40** and the screw **41** rotate in a clock-wise direction; the screw **41** thus screws into and penetrates the cork **11**.

The transverse pin **54**, rotating and descending downwards with the screw **41**, after a few millimetres of its travel begins to interfere with the vertical ribs **53**, thus making the tubular element **51** rotate also and with it the cutter wheels **58** which cut the circumference of the upper part of the cap **60**.

When the fin **33** of the block **29** descends, it activates the lower micro-switch **46** (position shown in the FIGURE with a line of dashes), the lower motor **38** is stopped and, simultaneously, the direction of rotation of the shaft **19** of the upper motor **18** is inverted.

As we have seen, the travel of the fin **33** and therefore of the screw **41** can be regulated at will, according to the height of the cork **11** to be pulled and according to how much the cork **11** has to be removed from the bottle **12** (completely or partly, according to the user's requirements), without ever completely perforating the cork **11**.

The micro-switch **46** in fact can easily be positioned at a variable distance, for example between 35 and 60 mm from the fin **33** in the inactive position, by operating on the knob **49**. The distance set can also be displayed by means of a graduated scale, not shown in the drawings, located in correspondence with the bracket **48**.

When the rotation of the shaft **19** is inverted, this causes the screw **25** to turn in an anti-clockwise direction, and consequently the block **29** is axially displaced upwards, as is the motor **38** and the screw **41** which, since it does not rotate, pulls the cork **11** upwards too, after having cut the upper part of the cap **60**.

The fin **33**, when it again reaches its inactive position, activates the micro-switch **45** which stops the upper motor **18**.

The sleeve **62** is then made to return upwards manually, to the inactive position, where with its fin **68** it again activates the micro-switch **66**, which causes the lower motor **38** to start in the opposite direction; in turn, the lower motor **38** makes the screw **41** rotate in the opposite direction, that is, anti-clockwise, which thus causes the cork **11** to be unscrewed and then expelled from the vertical ribs **53**.

After a few seconds, a timer, of a known type and not shown in the drawings, makes the lower motor **38** stop too.

It is obvious that modifications and/or additions can be made to the device to automatically open bottles as described heretofore, but these shall remain within the field and scope of the invention.

For example, instead of the micro-switches **45**, **46** and **66**, it is possible to use other electronic devices which allow to set the travel of the screw **41** and to display it on a display.

What is claimed is:

1. A device to automatically remove, at least partially, a cork having a defined length from a bottle, comprising:

a first screw able to penetrate a determined amount into the cork;

rotation means associated to said first screw to make said first screw selectively rotate and penetrate into the cork;

manually operable regulation means associated to said rotation means for defining said determined a mount of penetration of said first screw into the cork, according to the length of the cork in such a manner that the determined amount is less than the defined length of the cork, for avoiding that the cork is completely perforated by said first screw; and

extraction means connected to said first screw for causing the axial movement of said first screw and of the cork associated thereto from the bottle;

wherein said manually operable regulation means are also able to be set for obtaining an axial displacement of the cork from the bottle which amount is less than said defined length of the cork.

2. The device as in claim **1**, wherein the penetrative travel of said first screw into the cork is a few millimetres less than the length of the cork.

3. The device as in claim **1**, wherein said rotation means comprises a first electric motor connected to said first screw to command axial displacement thereof.

4. The device as in claim **3**, wherein said regulation means comprises electric switching means associated with said first electric motor to selectively stop and start said first electric motor.

5. The device as in claim **3**, wherein said rotation means comprises a second electric motor.

6. The device as in claim **5**, wherein said first and second electric motors are two-directional, wherein said second motor is able to make said first screw rotate in a determined direction during a simultaneous axial displacement of said first screw towards the cork by means of said first motor, so as to cause said first screw to screw into the cork, wherein preventing means are provided to prevent rotation of the cork once at least partially removed from the bottle, and wherein said second motor is able to make said first screw rotate in a direction opposite to said determined direction, while said first motor is stationary, so as to cause the cork to be expelled from said first screw and said preventing means.

7. A device to automatically remove a cork from a bottle, comprising:

a first screw able to screw into the cork and

rotation means associated to said first screw to make said first screw selectively rotate and penetrate into the cork,

wherein regulation means are associated to said rotation means for regulating penetration travel of said first screw into the cork according to length of the cork for avoiding said cork being completely perforated by said first screw, said regulation means being also able to be set for obtaining also partial removal of the cork from the bottle;

wherein said rotation means comprises a first electric motor connected to said first screw to command axial displacement thereof;

wherein said rotation means comprises a second electric motor; and

wherein said first motor is able to command axial displacement of said second motor by connection means connected to a shaft of said first motor.

8. The device as in claim **7**, wherein said connection means comprises a screw-nutscrew mechanism comprising a second screw and a nutscrew.

9. A device to automatically remove a cork from a bottle, comprising:

a first screw able to screw into the cork and

rotation means associated to said first screw to make said first screw selectively rotate and penetrate into the cork,

wherein regulation means are associated to said rotation means for regulating penetration travel of said first screw into the cork according to length of the cork for avoiding said cork being completely perforated by said first screw, said regulation means being also able to be set for obtaining also partial removal of the cork from the bottle;

wherein said rotation means comprises a first electric motor connected to said first screw to command axial displacement thereof;

wherein said rotation means comprises a second electric motor; and

wherein said first and second electric motors are assembled coaxial in a single tubular body substantially coaxial to said first screw.

10. The device as in claim **8**, wherein said first and second electric motors are assembled coaxial in a tubular body substantially axial to said first screw, wherein said nutscrew is attached inside said tubular body, wherein said second screw is solid with an element mounted axially sliding inside a tube keyed onto said shaft of said first motor, and wherein said element is made to rotate by said tube.

11. The device as in claim **7**, wherein said first and second electric motors are assembled in coaxial in a single tubular body substantially coaxial to said first screw, and wherein said connection means comprises a cylindrical element mounted axially sliding inside said tubular body and connected to a second screw to slide axially together therewith, said second motor being attached to said cylindrical element.

12. A device to automatically remove a cork from a bottle, comprising:

a first screw able to screw into the cork and

rotation means associated to said first screw to make said first screw selectively rotate and penetrate into the cork,

wherein regulation means are associated to said rotation means for regulating penetration travel of said first screw into the cork according to length of the cork for avoiding said cork being completely perforated by said first screw, said regulation means being also able to be set for obtaining also partial removal of the cork from the bottle;

wherein said rotation means comprises a first electric motor connected to said first screw to command axial displacement thereof;

wherein said rotation means comprises a second electric motor; and

wherein said regulation means comprise a first micro-switch and a second micro-switch able to selectively command the start, stop and inversion of motion of said first and second electric motors, and an actuator able to selectively activate each of said micro-switches.

13. The device as in claim **12**, wherein said actuator comprises a fin connected to said second motor and located between said first and second micro-switches.

14. The device as in claim **12**, wherein said first micro-switch is mounted on a stationary structure and wherein said second micro-switch is mounted on a support element selectively positionable with respect to said first micro-switch, defining a distance therebetween, so that the distance between said first and second micro-switches is selectively variable.

15. The device as in claim **1**, wherein the bottle includes a neck, covered with a protective cap, and wherein cutting means are provided to circumferentially cut at least a portion of said protective cap.

16. A device to automatically remove a cork from a bottle, comprising:

a first screw able to screw into the cork and

rotation means associated to said first screw to make said first screw selectively rotate and penetrate into the cork,

wherein regulation means are associated to said rotation means for regulating penetration travel of said first screw into the cork according to length of the cork for avoiding said cork being completely perforated by said first screw, said regulation means being also able to be set for obtaining also partial removal of the cork from the bottle;

wherein said rotation means comprises a first electric motor connected to said first screw to command axial displacement thereof;

wherein said rotation means comprises a second electric motor;

wherein the bottle includes a neck, covered with a protective cap, and wherein cutting means are provided to circumferentially cut at least a portion of said protective cap and

wherein a manual actuator is provided to actuate said cutting means, wherein said manual actuator is slidable with respect to the bottle, and wherein a switch is associated to said actuator to cause said first and second electric motors to start.

17. The device as in claim 9, wherein a nutscrew is attached inside said tubular body, wherein a second screw is solid with an element mounted axially sliding inside a tube keyed onto a shaft of said first motor, and wherein said element is made to rotate by said tube.

18. A device to automatically remove a cork from a bottle, comprising:

a first screw able to screw into the cork and

rotation means associated to said first screw to make said first screw selectively rotate and penetrate into the cork,

wherein regulation means are associated to said rotation means for regulating penetration travel of said first screw into the cork according to length of the cork for avoiding said cork being completely perforated by said first screw, said regulation means being also able to be set for obtaining also partial removal of the cork from the bottle;

wherein the bottle includes a neck, covered with a protective cap, wherein cutting means are provided to circumferentially cut at least a portion of said protective cap,

wherein said rotation means comprises a first electric motor connected to said first screw to command axial displacement thereof;

wherein said rotation means comprises a second electric motor; and

wherein a manual actuator is provided to actuate said cutting means, wherein said manual actuator is slidable with respect to said bottle, and wherein a switch is associated to said actuator to cause said first and second electric motors to start.

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